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HEAVY BACKING FOR TEXTILE AND OTHER FLEXIBLE FLAT-SHAPED ARTICLES

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The object of the invention is a plastic backing, preferably on a textile flat-shaped article, which, because of its high filling with iron powder, is characterized by a high specific gravity, which is desirable and results in, for example, a floor covering--in particular, if it is used in the form of loose-lay tile--lying firmly on the floor because of the center of gravity, which is considerably shifted downwards.

The spreading of carpets and coverings on the floor in living rooms and other rooms, so as to attain a greater heat and sound insulation, stepping elasticity, aesthetics and thus greater comfort, is being practiced more and more. Within the various types of floor coverings, so-called loosely fitting and loose-lay tiles are very popular. Since the tiles always have only a size of 40 x 40 cm or 50 x 50 cm, the problem of making the tiles slip-proof frequently arises, so as to prevent the person walking on them from the danger of slipping or stumbling and thus from injury.

Up to now, one has simply had recourse to the application of an adhesive or pressure-sensitive adhesive on the underside of the tiles; the adhesive is covered with a film or paper layer up to just before the laying of the floor covering or is spread on the underside of the floor covering or on the floor to be covered during the laying of the covering, thus giving the tile the necessary firm hold. Upon removing the tiles from the floor underneath, however, there were undesired deficiencies, such as, for example, the soiling of the floor with adhesive residues or such a good adhesion between the adhesive and floor that upon removal of the tiles, parts of the floor, such as, PVC, parquet, felt, cork, enamel, flooring plaster, and so forth, were torn out. For this reason, the cementing method is, once again, abandoned and one goes on to use so-called loose-lay tiles.

The loose-lay tiles should be constructed in such a way that their center of gravity is as close as possible to the floor--that is, their lower layer must consist of a so-called heavy backing, which should not be particularly thick, so as not to be detrimental to the textile character of the floor covering, [but] must nevertheless have a great weight. The previously common backings, using, for example, chalk, limestone powder, and heavy spar as the usual, cheap fillers, do not fulfill this requirement; above all, they cannot be poured excessively into the plastics used as carpet backings, without considerably impairing the characteristics, that is, the plastics become brittle, crumbly, and fragile with an excessively high filling.

The goal therefore was to develop a heavy backing which provides a remedy for the existing deficiencies. In accordance with the invention, one proceeds in the following manner:

Iron powder, with a particle size of 0.1 to 250 μm, is mixed into the plastic commonly used for carpet backings, for example, plasticizer-containing polyvinyl chloride, below called PVC for short. Dissolvers, planetary paddle mixers, or other compulsory mixers are mainly used as mixing tools. The wish here is to mix in the filler as much as possible, so as to produce the heavy backing in accordance with the invention with a high specific gravity. The degree of the mixing-in capacity depends primarily on the type of plastic and secondarily, on the average particle size, and the particle size distribution of the filler.

In the case of the aforementioned PVC, using iron powder as the filler, one finds the following dependency of the average particle size on the iron powder:

	Parts by weight in the mixture			
PVC	20	20	20	20
Plasticizer (DOP)	20	20	20	20
Iron powder	80	100	120	140
Average particle size in μm	25	50	100	150

The cited mixtures represent readily spreadable pastes with a viscosity of 5000 to 10,000 cP, can be gelled quickly and in thick layers up to 8 kg/m^2, and have an excellent flexibility after the gelling out. The dependency of the degree of filling on the plastic type is substantially more serious, in comparison to the dependency on the average particle size, as the following list of some distinctive plastics show when using iron powder with an average particle size of 25 µm [and] with a particle size distribution between 1 and 50 µm:

	Parts by weight in the mixture	
	Plastic	Iron powder
Low-pressure polyethylene	90	10
High-pressure polyethylene	70	30
Hard PVC (100 PVC:30 DOP)	50	50
Soft PVC (60 PVC:40 DOP)	30	70
Atactic polypropylene	15	85
Polystyrene butadiene	5	95

With a higher filling, the plastics lose their original characteristics to such an extent that either their processing is no longer possible or their performance capability declines so much that one can no longer conceive of a large-scale use.

In the use of iron powder as the filler in accordance with the invention, it is possible to emphasize, individually, the following advantages, in comparison to the usual fillers:

1. a high specific gravity of over 7;

2. a high bulk weight of 2.5 kg/L and thus less storage room requirement;

3. blowable and thus transportable in dust cars;

4. low oil absorption value and thus low plastic and plasticizer bonding, which results in a low impairment of the flexibility and the other characteristics of the plastic;

5. outstanding weathering and aging resistance;

6. optimal antiecho and sound absorption effect;

7. acceleration of the gelling and sintering of the plastic and shortening of the cooling time and zone after leaving the hot channel and after application of the melt due to the high specific thermal conductivity;

8. antistatic effect with a sufficiently high degree of filling;

9. low wear of the stirring tools, extruders, doctors, and so forth because of the amorphous structure of the filler;

10. layers up to 8 kg/m^2 can be applied in one single stroke and gelled;

11. the wear resistance is higher than with other heavy fillers and thus, no crumbling out of the plastic layer;

12. plasticizer migration is stopped as a result of the possible high degree of filling;

13. cold flow, for example, in atactic polypropylene, is reduced;

14. flame-retarding effect is attained;

15. high degree of filling is possible; depending on the type of plastic, the ratio 90 parts by weight iron powder to 10 parts by weight plastic is attainable (see also, table above); thus, a considerable cheapening of the finished mixture is attained, since the iron powder is far cheaper than any common plastic, including regenerated waste;

16. stabilizer effect, for example, in PVC.

If PVC is used as the plastic in the heavy backing in accordance with the invention, then one no longer needs to use a stabilizer, since the elementary iron chemically bonds acids forming during thermal or photochemical decomposition, such as hydrochloric acid or oxygen-containing chloric acids, and thus stops any further decomposition. Furthermore, only little light penetrates the heavy backing in accordance with the invention, particularly during exposure, because of the dark color of the heavy backing, and little oxygen because of the high packing specific gravity, so that in this way, degradation is stopped.

As a result of the excellent stability of the heavy backing with respect to weathering and the related decomposition, it is suitable as a roof tarpaulin to cover flat roofs and other roofs and as a cover tarpaulin for freight vehicles, track vehicles, or stored goods, and can be used in these sectors successfully. The weight, which is affected by the heavy backing and is higher in comparison to the usual tarpaulins, for example, made of PVC-coated fabrics, which is the main condition in loose-lay carpet tile, does not cause any special disturbance with roof tarpaulin, since it is mostly placed loosely on the flat roof--that is, without it being cemented onto the roof, so that the increased weight produces a fixed position of the tarpaulin, which is desired.

The specific gravity of the heavy tarpaulin in accordance with the invention is, purely mathematically, above 5, for example with a mixture of 30 parts by weight soft PVC and 70 parts by weight iron powder. In actual practice, however, only values between 2 and 2.5 are found. The reason for this is that air is entrained into the plastic by the iron powder, which only very slowly escapes because of the high viscosity of the paste. Since the paste tends to sediment because of the high specific gravity of the iron powder and the iron powder settles in a very hard, cement-like, no longer stirrable form, the paste has to be spread and gelled as soon as possible after it is prepared. The result of this is that the air which is found in it is retained in the mixture and in this way, the specific gravity in the delivered state, which does not correspond to the theory, is as already mentioned above.

Nevertheless, the attained specific gravity of approximately 2.5 is sufficient so as to produce for the loose-lay plates the stable position proper for their name, which is the actual goal of the object of the invention. In some cases, what is desired is to convert the heavy backing in accordance with the invention into a heavy foam--that is, the air content should be raised artificially--so as to attain greater heat and sound insulation. This wish appears to contradict the actual goal of the object of the invention, but this contradiction will be refuted by the following example.

In the coating of tufted carpets, mechanically whipped foam is mainly used--for example, foam made of styrene butadiene latex in a layer thickness of approximately 3 mm. This has proved to be good for years, is relatively light with a liter weight of ca. 350 g, and nevertheless gives the tufted carpet, which is very limp without this backing, a certain desired status, without making the total weight of the carpet excessive. With sheet goods, this type of backing is ideal. This is not the case, however, for loosely fitting and loose-lay tiles, which are increasingly in demand. They rise easily from the floor, become uneven, and are thus unsatisfactory. The application of adhesive does not work here for the reasons already cited above and above all, because of the fact that the foam is relatively unstable and does not have any great mechanical strength. The result is that when the tiles rise from the floor, parts of the foam are torn out from the back of the tile and the tile can thus be considerably damaged, which hinders its further use.

What is desired here is a heavy backing which is formed as a foam. In accordance with the invention, the procedure is such that iron powder is admixed to the latex in as high as possible a concentration, and the mixture then mechanically foams just as if there were no iron powder contained in it, but rather no fillers or only common fillers. With a correspondingly high filling, the resulting foam has approximately three times a higher liter weight than common foam. The weights are compared in the setup below:

	Layer thickness	Square meter weight
Normal foam	3 mm	1050 g
Heavy foam	3 mm	2700 g

In this case, it is a heavy backing, even if in the form of foam.

The application of the heavy backing on the textile carriers is done in the form of a paste in many cases. This is the case, for example, with the PVC, described in detail, as well as with polyurethane, styrene butadiene, natural latex, acrylate, and so forth. There are, however, a number of application methods also, which, in part, deviate considerably from the paste, which is spread while cold. Especially the PVC can also be applied as a type which cannot be prepared as a paste, in the form of a hot, thick film, as is always the case, for example, with atactic polypropylene. The plastic, as a prefabricated film, can also be coated with an adhesive or by melting onto the carrier.

It is also possible to sprinkle or to doctor the heavy backing onto the textile material in the form of a powder or trickling fine granules, wherein the powder or fine granules are sintered, mostly by a subsequent thermal treatment, and sometimes are pressed on mechanically afterwards, so as to impart to the heavy backing a better adhesion to the textile carrier.

Of course, one can also use other flexible, flat-shaped articles, such as films made of plastic, cellulose, metal, and so forth, nonwovens and fabrics from metal wires and chips, paper, cardboard, flat-shaped articles from split films, and so forth, as carriers for the heavy backing. Especially the backing of steel fiber nonwovens with an iron powder-containing heavy backing is sensible, since excellent flexible magnetic adhesion boards result from this.

The described object of the invention is a previously not yet known and described innovation. A patent is desired for the heavy backing in accordance with the invention.

Claims

1. A heavy backing for textile and other flexible, flat-shaped articles, characterized in that it consists of plastic common for the coating of textile, flat-shaped articles, preferably floor coverings, such as PVC, polyurethane, atactic polypropylene, polyethylene, polyacrylate, polystyrene butadiene, chlorinated rubber, nitrile rubber, natural latex, silicone rubber, unsaturated polyester resins, epoxide resins, rubber, bitumen, polyvinyl alcohol, polyvinyl acetate, and so forth, and mixtures and copolymers of the aforementioned and similar plastics, which is filled with a specific heavy filler, preferably made of iron and its alloys, in a particle size of 0.1 to 250 µm, in such a way that 20 to 95 wt% metal powder and 80 to 5 wt% plastic are found in the finished mixture, and which is applied in the form of a paste, solution, hot melt, film, or a powder, fine or trickling granules, and so forth on the textile, flat-shaped article, for the purpose of weighting and covering it and is made to adhere to the textile, flat-shaped article by means of gelling, sintering, pouring on, hardening out, pressing on, a transfer process, immersion, cementing, flame laminating, and so forth.

2. Heavy backing for textile and other flexible, flat-shaped articles according to Claim 1, characterized in that in addition to, or instead of, the preferably used iron powder, other metal powders, such as zinc, aluminum, lead, titanium, chromium, molybdenum, copper, manganese, and so forth, or their alloys, such as bronze, brass, and so forth, or mixtures of them and also other fillers, such as heavy spar, fluorospar, aluminum oxide, quartz powder, mica powder, ground shale, limestone powder, chalk, graphite, antimony trioxide, asbestos powder, titanium dioxide, and so forth, can be used to increase the specific gravity of the heavy backing mass.

3. Heavy backing for textile and other flexible, flat-shaped articles according to Claims 1 and 2, characterized in that it is applied for the purpose of better heat and sound insulation and greater treading elasticity, as a coarse- or fine-porous foam, by means of chemical or mechanical

foaming, during or before the application on the textile, flat-shaped article, wherein, nevertheless, the character of a heavy backing is retained, since a comparable, different plastic foam always has a specific gravity that is two to three times smaller.

4. Heavy backing for textile and other flexible, flat-shaped articles according to Claims 1 to 3, characterized in that in addition to, or instead of, the preferably used textile, flat-shaped article, other flexible, flat-shaped articles, such as films made of plastic, cellulose, acetate, metal, rubber, and so forth, metal fabrics and metal fibrous nonwovens or split films, foam, and so forth, can also be used as carriers for the heavy backing.

5. Heavy backing for textile and other flexible, flat-shaped articles according to Claims 1 to 4, characterized in that the backing can be found on both sides of the carrier or that it is covered above and below by the textile, flat-shaped article, or that it is present in the form of a composite body of several layers of carrier and backing mass, or that it is practically only one single layer, if, for example, a large-pore nonwoven, a lattice fabric, a thread composite, and so forth, is used as a carrier.